Study Group concerning the Vision of the Future Society
Brought by Accelerated Advancement of Intelligence in ICT
"Report 2015" (Released on June 30, 2015) (Abstract)

The rapid development of Information and Communications Technology (ICT) is expected to bring gigantic transformation to human society as a result of the following changes: (1) Emergence of machines with highly advanced intelligence, which can assist or substitute human brainwork at the level of a human brain, (2) Further sophistication of those machines in accordance with the development of networks between those machines, and (3) Direct and seamless connection of humans to those networks with various interfaces.

This report discusses the following matters: (1) How the changes in human society (*that is*, as precisely defined below, "*Changes by the Advancement of Intelligence in ICT*" or "*CHAIN*") will alter the relationship between humans and machines as well as the relationship among humans, and hereby what kind of changes will occur in human society, (2) What should humankind do in order to utilize the newly emerging technologies and systems well (*that is*, as precisely defined below, "*Intelligent ICT*") now.

(* This report is established based on the discussions among industry and academia stakeholders in a wide range of fields, such as the fields of Information and Communications Technology (ICT), Internet of Things(IoT), Artificial Intelligence (AI), Cognitive Psychology, and Economics. The Study Group was chaired by Prof. Jun Murai, Dean of the Faculty of Environment and Information Studies, at Keio University and has been established at the Institute for Information and Communications Policy (IICP) under the Ministry of Internal Affairs and Communications (MIC) since February 2015.)

✓ *Definition*

In this report "*Changes by the Advancement of Intelligence in ICT*" (or "*CHAIN*") and "*Intelligent ICT*" are defined as follows: "*Changes by the Advancement of Intelligence in ICT*", or "*CHAIN*", refers to significant advances in intelligence in ICT as well as the development of collaboration between ICT and humans brought by the simultaneous, parallel, and accelerated progress of various technologies related to computers and telecommunications. This includes the following items: (1) Performance improvements in computers, (2) Advance of AI technology, (3) Progress of the data digitalization of any field, (4) Globalization of the Internet, (5) Progress of distributed processing, as well as (6) Collaboration of human brains and AI. "*Intelligent ICT*" refers to the integral of technologies and systems that bring *CHAIN*.

✓ *Vision of the Future Society*

In the future, as a consequence of technological progress and its implementation in society, humans will be surrounded by a variety of *Intelligent ICT*, and their activities will depend further on *Intelligent ICT*, the presence of which will be a prerequisite not only for humans' day-to-day decision-makings but also for their socially important decision-makings.

Intelligent ICT achieves autonomous harmonization in various scenes such as transportation and our living environments. For the next step, *Intelligent ICT* (especially, AI) devices/systems will coordinate and adjust automatically with each other across fields, which will achieve adjustments beyond humans' possible understanding. Furthermore, through humans seamlessly connecting to

their networks, their environment will be automatically controlled, and humans will be able to control the surrounding spaces in real time.

Before long, advanced AI will be established as talented butlers, or family members, for humans' lives, and hereby humans will "coexist" with *Intelligent ICT*.

Regarding the vision of the future society, it has been discussed whether or not "Artificial Super-intelligence "(AI in excess of humans' intelligence) would be born. The question is related to the question whether or not Singularity will be reached. The Study Group's major recognition is that AI partly superior to humans' abilities could be achieved in 2045 as a tentative goal. However AI equivalent to humans' intelligence including humans' physical and social abilities as a whole would not be achieved by then. If a longer term is considered, however, the view is also discussed that Artificial Super-intelligence might be born.

The discussion over the impact of *CHAIN* on society and economy has just started. Presently, the following matters can be pointed out: (1) Technical innovation accompanying the progress of *CHAIN* will continue for a long time and greatly influence the world's economy and employment. (2) Humans' employment will be increasingly substituted by *Intelligent ICT* but, on the other hand, new employment opportunities will be created as well. In the long term, a large gap of income might be a major issue.

✓ *Issues to be addressed immediately toward the transition to a future society brought by Intelligent ICT*

It is necessary to start actions in order to utilize the technologies to open up the future of human society well. Issues to be addressed immediately are classified into the following five items. These issues should not be addressed only in Japan but should be globally shared and solved. The industrial sector, academic sector, and governmental sectors in the world should cooperate to address these issues immediately.

(1) Very versatile and advanced functions achieved by *Intelligent ICT* need to be developed for the betterment of human society. Policies should be established through intersectoral discussion to maximize the benefits of *Intelligent ICT* while mitigating adverse effects.

(2) It is necessary to clarify relevant issues in the social implementation of *Intelligent ICT*. E.g., to what extent the decision-makings related to life-threatening matters or ethical matters can be entrusted to *Intelligent ICT*; Who or what will take responsibility for serious defects; Whether it is valid to create *Intelligent ICT* devices that have emotion or consciousness.

(3) Progress in data digitalization and its utilization of all things will alter the situation related to privacy. The scope of privacy protection and the way to materialize it should be reconsidered along with the advancement of *Intelligent ICT*.

(4) As the co-existence of *Intelligent ICT* and humans proceeds, humans' behaviors and thought will possibly be altered, as well as human society changing in various aspects. Studies concerning social systems, including education systems and labor systems, should be implemented in view of these changes.

(5) Evaluation and analysis of the impacts and risks caused by *Intelligent ICT* to the society and economy ("Impact Study" and "Risk Study") should be started immediately by the collective wisdom of the nations in the world.